Goddard Procedural Requirements (GPR)

DIRECTIVE NO.	GPR 8719.1D	**APPROVED BY Signature:**	*Original Signed By*
EFFECTIVE DATE:	March 19, 2018	**NAME:**	Richard Barney
EXPIRATION DATE:	March 19, 2023	**TITLE:**	Director, Safety and Mission Assurance

COMPLIANCE IS MANDATORY

Responsible Office: 360/Safety Division

Title: Lifting Devices and Equipment (LDE) Certifications and Operations

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PREFACE

P.1 PURPOSE

The purpose of this directive is to define the process, requirements, and responsibilities for performing Lifting Devices and Equipment (LDE) certifications and conducting safe lifting operations at Goddard Space Flight Center (GSFC) by implementing the requirements of NASA-STD 8719.9, Lifting Standard.

P.2 APPLICABILITY

a. This directive is applicable to all lifting certifications and operations, regardless of ownership of the LDE or the item being lifted, performed at and/or under the cognizance of GSFC, or that are performed by GSFC employees or support services contractors (to the extent provided in their contract), unless specifically excluded by this directive or by the Lifting Devices and Equipment Manager (LDEM).

b. This directive is not a substitute for applicable Occupational Safety and Health Administration (OSHA) and National Consensus Standards (NCS) and other applicable code requirements that apply to GSFC LDE, LDE Operators, and their respective operations.

c. Lifting operations under privatization clauses shall be subjected to the provisions of this directive to the extent provided by the contract, and the requirements clearly specified therein.

d. Chapter 6 of this document is only applicable to the Greenbelt location of GSFC.

e. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

f. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms “may” or “can” denote discretionary privilege or permission; “should” denotes a good practice and is recommended but not required; “will” denotes expected outcome; and “are/is” denotes descriptive material.

P.3 AUTHORITY

NPR 8715.3, NASA General Safety Program Requirements

P.4 APPLICABLE DOCUMENTS AND FORMS

a. 29 CFR 1960 – Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters (Fed OSHA)
b. NPR 1800.1, NASA Occupational Health Program Procedure
c. NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

d. NASA-STD 8709.20, Management of Safety and Mission Assurance Technical Authority Requirements
e. NASA-STD 8709.22, Safety and Mission Assurance Acronyms, Abbreviations, and Definitions
f. NASA-STD 8719.9, Standard for Lifting Devices and Equipment
g. GPR 1400.1, Waiver Processing
h. GPR 8621.4, Mishap Preparedness and Contingency Plan
i. GPR 8715.8, Fall Protection Requirements for GSFC
j. ASME B30 Series
k. Additional forms associated with the GPR located in Section 6

P.5 CANCELLATION

GID 8719.2, Lifting Devices and Equipment (LDE) Certifications and Operations
GPR 8719.1C, Certification and Recertification of Lifting Devices and Equipment and its Operators

P.6 SAFETY

Detailed safety requirements are contained in applicable test and inspection procedures and throughout this document.

P.7 TRAINING

Those involved in lifting operations (i.e. lift team members) must be qualified to perform their role safely and effectively, based on initial and recurrent training, prior experience, and physical abilities.

When a designated spotter is required, he or she shall be pre-briefed on the operations of a mobile aerial platform by a licensed LDE operator.

Specific training requirements for LDE personnel licensing/certification are specified in NASA-STD 8719.9 and this directive.

P.8 RECORDS

Table 1

Records Pertaining to LDE Certification Program			
No.	Record Title	Record Custodian	Retention
1	LDE Test & Inspection Reports	LDEM	Periodic: 4 Inspection cycles Frequent: 12 Inspection cycles
2	LDE Operator Certifications	LDEM	*NRRS 3/33C Destroy or delete 5 years after separation of employee or when no longer needed, whichever comes first.

Records Pertaining to LDE Certification Program			
No.	Record Title	Record Custodian	Retention
3	Completed Pre-Operational Daily Checklists	LDE Owner	For a minimum of 12 months
4	Safety/Hazard Analysis	LDE Owner	*NRRS 8/56.5A(4) Destroy when 3 months old or when no longer needed, whichever is later.
5	Lifting Device and Equipment Committee (LDEC) Meeting Minutes	LDEM	*NRRS 1/14B (1)(a) Permanent. Retire to FRC when 2 years old. Transfer to NARA when 20 years old.

Table 2

Records Pertaining to LDE Lifting Operations			
No.	Record Title	Record Custodian	Retention
1	Lift Procedure(s)	Project/Program Office	*NRRS 8/103: Temporary. Cut off records at close of program/ project or in 5-year blocks. Destroy/delete between 0 and 30 Years after cutoff.
2	Stress/Stability Analyses	Project Office	*NRRS 8/103
3	Waivers	Project/Program Office	* NRRS 8/103
4	User documents (e.g., technical interface information, analyses, problem records, and other relevant lift-specific information	Project/Program Office	* NRRS 8/103
5	Audit results (see P.9 Metrics) and corrective actions	Applicable Safety Office	* NRRS 8/103
6	LDE Program follow-up actions to metrics	LDEM	* NRRS 8/103

**NRRS – NASA Records Retention Schedules (NRRS 1441.1)*

P.9 MEASUREMENT/VERIFICATION

Appropriate data, which may include information derived from activities specified in paragraphs 1.2.1 d and 1.2.1 g (e.g., number of deficiencies identified, time to complete corrective actions, number of waivers generated, etc.), the results of audits and mishap investigations (including tracking of appropriate follow up actions) and analysis of trends, shall be captured and analyzed to measure the performance of GSFC lifting operations.

PROCEDURES

1 Responsibilities

1.1 Installation Director:

Shall appoint the LDEM for GSFC-Greenbelt (GB) and for GSFC-Wallops Flight Facility (WFF).

1.2 Lifting Device and Equipment Manager (LDEM):

1.2.1 The LDEM shall

a. Serve as the authority for the certification of LDE to which this directive is applicable; and serve as the final authority on interpretation of, and compliance with, this directive and its reference documents;

b. Maintain oversight, for safety, use and compliance, of all LDE, including Lifting Devices (LD) brought onsite for lifting, setting/placing, and delivering equipment to center;

Note: *The LDEM has the authority to designate categories of lifts for which their concurrence will be obtained to verify the criticality rating for lifts designated as non-critical or critical*;

c. Certify/ recertify LDE Operators and define their training and retraining requirements; and review, approve, and monitor the training courses for qualifying LDE Operators;

d. Establish and maintain a system for frequent and periodic inspections of LDE including review of logbooks, pre-operational daily inspection forms, identification of deficiencies, and completion of corrective actions; and will ensure that certification and/or recertification tests and inspections are performed by personnel properly trained and qualified in accordance with applicable codes and standards;

e. Verify that all applicable safety analyses or assessments (i.e. stress analysis, stability analysis, etc.) are completed in accordance with the requirements of NASA-STD 8719.9 for critical LDE and/or lifts;

f. Review and concur/non-concur with safety waiver requests regarding LDE per GPR 1400.1 prior to the originator’s submittal to the appropriate chain-of- authority, for approval;

g. Review/approve requests from LDE Owner organizations to re-rate the capacity of its LDE; and

h. Establish and maintain a LDE Program configuration management system; and facilitate requesting authorities regarding the need to understand the status of their LDE; and provide LDE owners with a current LDE inventory when requested.

1.2.2 The LDEM should:

a. Provide consultation to the GSFC for procurement, design, specification, testing, maintenance, operation, and modification of LDE to owners and operators; and review and concur/non-concur with specifications/designs prior to procurement of Lifting Devices (LD); and have approval authority for the re-rating of LDs per this directive;

b. Coordinate with the Office of Human Capital Management (OHCM) to ensure all LDE Program training classes are entered in SATERN at least 30 days prior to the start of each class;

c. Perform compliance spot checks of the LDE Program to ensure that the requirements of NASA-STD 8719.9 and this directive are being met; and

d. Analyze audit results or mishap investigations for appropriate follow up actions to include trend analysis, lessons learned, directive revision and continual improvement, when deemed necessary

1.2.3 The LDEM may:

a. Provide LDE expert advice, as requested, during the investigation of any lift involved in a mishap, incident or close call to ensure compliance with this directive in accordance with NPR 8621.1;

b. Audit executed lift procedures and associated documentation of different projects and activities under his cognizance for compliance with this directive;

c. Designate specific critical lifts or categories of critical lifts for which his/her prior review and concurrence with the lift procedures is required; and

d. Authorize contractor organizations to perform LDE certifications (tests and inspections) at government owned, contractor operated facilities by the applicable contractor organization provided the contractor has a test and inspection plan satisfactorily addressing GSFC requirements, including personnel qualifications; and the contractor's plan has been reviewed and approved by the LDEM.

1.2.4 The LDEM will:

For constrained lifts, review and provide concurrence with the risk assessment provided by the LSU prior to performance of the constrained lift.

1.3 LDE Owners:

1.3.1 LDE Owners shall:

a. Submit LD specifications to the LDEM for review and concurrence for applicable code compliance prior to purchase or transfer to GSFC; and should submit Lifting Equipment (LE) specifications to

the LDEM for review and concurrence for applicable code compliance prior to purchase or transfer to GSFC;

b. Notify the LDEM when rented or leased equipment is brought on Center;

c. Request that the LDEM perform the certification of new or transferred LDE from offsite locations prior to their use at GSFC;

d. Ensure that LDE not covered by this directive or the NASA standard complies with OSHA and the applicable NCS requirements;

e. Provide LDE to the LSU that has been appropriately certified, maintained and calibrated;

f. Maintain responsibility for day-to-day operations of all LDE under their cognizance;

g. Track LDE operator certifications to ensure that they remain current as long as the operator is required to use LDE;

h. Ensure that Original Equipment Manufacturer (OEM) recommended maintenance is performed on LDE and that the preoperational daily checklists conforms to OEM requirements, if applicable;

i. Forward copies of all LDE test and inspection reports, including those for applicable off-site operations and applicable contractor installations, to the LDEM for annual re-certification and record keeping;

j. Specify the criticality category of lifting operations to be performed by their LDE so that the LDEM may provide the requisite compliance requirements for the LDE; and

k. Initiate repairs for LDE deficiencies found during OSHA and NASA-STD 8719.9 required tests and inspections; and coordinate outages for load testing and inspections of inventoried LDE with LDE Program/LDEM to minimize conflicts with ongoing operation.

1.3.2 LDE Owners may:

a. Support the LSU in developing and reviewing Critical Lift Procedures prior to all critical lift operations; and certify to the LSU that all Critical Lift requirements have been met; and ensure that lift procedures and checklists, when needed are available and understood for lifting operations; and

b. Provide or task supporting organizations or contractors to provide LDE and/or operators; and provide LDE expert advice to the LSU for all lifting operations when requested to ensure professional and safe performance of all lifting operations.

1.3.3 LDE Owners will:

a. Provide LDE and LDE support to the Lifting Service User (LSU);

b. Ensure training resources are available from the Office of Human Capital Management (OHCM) in order to ensure that LDE personnel will be properly certified by the LDEM;

c. Determine the appropriate LD usage category, i.e., Active, Standby, or Idle based on current and projected operational requirements; and notify LDEM of any change in usage category status; and verify that deficient LDE has been appropriately removed from service;

d. Manage and control uncertified or expired LDE by establishing administrative controls to preclude unauthorized operation. Such controls may include administratively controlling access to areas in which LDE are located, or securing LDE to all but authorized users/operators;

e. Notify the LDEM of all LDE deficiencies and failures; and initiate the appropriate Incident/Mishap Report in accordance with GPR 8621.4; and

f. Involve Facilities Management Division during the design and procurement of overhead cranes on Center.

1.4 Lifting Service User (LSU):

The LSU is ultimately responsible for the hardware being lifted.

1.4.1 The LSU shall:

a. Cease lifting operations in the event of an actual or reported failure or unsafe condition and only resume operations after failures or unsafe conditions have been properly addressed and/or corrected. Approval from LDEM to continue is necessary;

b. Notify the LDEM and/or Safety (360/803) of all LDE, including leased/rented LDE, coming on center for projects or institutional (construction and/or maintenance) activities; and ensure all LDE associated personnel comply with OSHA and this directive;

c. Notify the Facilities Management Division (FMD) and/or Facilities Operation Manager (FOM) of any operations that may have unusual facility hazards or safety implications; and

d. For constrained lifts, perform a risk assessment and acknowledge and accept the risks involved.

Note: *A copy of this risk assessment is sent to the LDEM for review and concurrence prior to performance of the constrained lift in accordance with Section 1.2.4.*

1.4.2 The LSU should:

a. Designate a Safety Representative per Section 1.5.5 of this directive;

b. Verify that all applicable safety analysis (i.e. stability analysis, lift analysis, hazardous operating procedures, etc.) and assessments are completed and are sufficient per the requirements of NASA-STD 8719.9;

c. Provide input to the LDE Owner and LDEM to determine lift criticality so that compliance requirements for the lifting operations can be established; and develop and approve all Critical Lift Procedure(s) and any changes made to the procedure during the lift;

d. Develop and/or verify the availability of lifting procedures and hazardous operations procedures (HOPs) that address the safety of their personnel and hardware; and for LDE not covered by NASA-STD 8719.9, consult and follow the OEM's recommendations with documented concurrence from the applicable safety representative;

e. Designate a person-in-charge (PIC) for all lifting operations; and select appropriate LDE based upon the maximum load it would experience in the worst case scenario during each lift; and verify that the LDE and operators have current certifications as required by NASA-STD 8719.9 and this directive for the type of lifting operations required; and

f. Initiate a Waiver request, if NASA or GSFC requirements will not be met, in accordance with NPR 8715.3 and GPR 1400.1, as applicable.

1.4.3 The LSU will:

a. Provide specialized LDE/fixtures and engineering support as required;

b. Submit mobile crane lift plans to the LDEM for approval prior to the lift, which may also require Safety (Code 360/803) concurrence; and
c. Coordinate closely with the LDE Owners to establish control of lifting operations that affect their hardware.

1.5 Lift Team

1.5.1 Lift Team Members

Lift team members are selected by and have responsibilities assigned by the Person-In-Charge (PIC).

a. Lift team members should participate in Pre-Lift Briefings as described in this directive; and fully understand all applicable emergency procedures and safety requirements, including Personal Protective Equipment (PPE) requirements.

b. Critical lift teams shall, as a minimum, consist of the following members:

(1) Person in Charge (PIC);
(2) Certified LDE (Crane) Operator;
(3) Certified Rigger(s);
(4) Certified Signal Person; and
(5) Safety Representative

c. The PIC may add to the lift team as appropriate to ensure a safe lift.

d. For routine non-critical lifts, a lift team may consist of only a LDE (crane) operator after a written pre-lift safety assessment (such as job hazard analysis), has been completed in conjunction with the operator's immediate supervisor or designee and approved by the LDEM.

e. If any lift team member is not satisfied that all aspects of the lift are correct and complete prior to the lift, he/she has the authority to refuse to perform the lift until all issues have been resolved. Issues that cannot be resolved onsite by discussion with the PIC and lift team members will be brought to the immediate attention of the LDEM.

1.5.2 Person-In-Charge (PIC):

The PIC is designated by the LSU or owner of the hardware being lifted and has overall responsibility to manage and conduct the lifting operation. The PIC:

a. Shall assign responsibilities to each individual member of the lift team and ensure all team members have the required current certifications.

b. The PIC will not perform rigging activities or hands-on operation of LDEs while acting as the PIC of critical lifting operations.

c. Will conduct a pre-lift briefing with all the required participants in accordance with the guidelines in this directive, which includes instructing team members in the proper preparation, rigging, lifting, and final positioning of the load.

d. Will verify that adequate communication processes are in place for the lifting operations, especially between the signal person and LDE operator.

1.5.3 Certified LDE Operator:

The Certified LDE Operator shall:

a. Be certified by the LDEM in accordance with the NASA-STD 8719.9;

b. Verify that the LDE operational requirements for the type of lifting devices and/or equipment being used comply with NASA-STD 8719.9 and that the certification status of the LDE is current in accordance with NASA-STD 8719.9, OEM recommendations, GSFC procedures and this directive before commencing lifting operations;

c. Ensure that the LDE pre-operational daily inspection has been satisfactorily completed and that all LDE pre-operational daily inspection checklists have been filled out prior to commencing lifting operations each day;

d. Log all pre-operational daily inspection checklists into the LDE log book or other documenting means; and if any critical deficiencies that may affect the safe operation of the LDE have been noted, the LDE operator shall immediately secure the LDE and notify his/her immediate supervisor; with immediate notification to the LDEM; and

e. Verify that the weight of the load being lifted is within the Safe Working Load (SWL) of the LDE; and ensure stability of the load by verifying its center-of-gravity in relation to the location of the lifting points; and that the load is rigged correctly and safely prior to performing the lift.

1.5.4 Certified Rigger/Signal Person:

The Rigger/Signal Person is certified by the LDEM in accordance with the NASA-STD 8719.9. The Certified Rigger/Signal person shall:

a. Comply with the requirements and responsibilities of being a rigger during a lifting operation.
b. Verify that all tools, equipment, rigging gear, etc. are adequate and appropriately certified for lifting operations.

1.5.5 Safety Representative:

The Safety Representative is designated by the LSU to make responsible judgments concerning personnel, equipment, or systems safety in support of critical lift operations; to work with the PIC and lift team to ensure the safety of the lifting operation; and to verify that the lifting operation adheres to safety requirements of this directive and all applicable OSHA, NASA, and GSFC safety regulations.

The Safety Representative:

a. Shall review and approve or concur with all critical lift procedures.

Note: *For lifts that have been determined to be non-critical, the safety representative approval is optional.*

b. Shall verify that Incident/Mishap/Hazard Reports are initiated and submitted in accordance with the requirements of NPR 8621.1 and GPR 8621.4.

c. Shall identify and safely secure the operating envelope prior to operations and verify that all personnel within the operating envelope area have the appropriate PPE prior to commencing lifting operations. See Appendix C for recommendations.

d. Should review and concur/non-concur with project-initiated safety waiver/variance requests in accordance with NASA-STD 8709.20, NPR 8715.3 and GPR 1400.1 prior to submittal to the LDEM.

e. May provide input to the LSU organization to identify the lifting operations as critical or non-critical; and

f. Will ensure adequate control over the area/envelope prior to proceeding with the lifting operation and during lifting operations; and give concurrence to open the controlled area once the lifting operations have been completed. See Appendix C for recommendations.

1.6 Institutional Support

1.6.1 Facilities Management Division (FMD) will:

a. Adhere to applicable LDE Owner and LSU requirements for non-critical operations, by appointing a PIC;

b. Notify the LDEM, in writing, of any planned LDE acquisition, installation, modification/upgrade or removal as part of a FMD project; and

c. Provide all new LDE designs and specifications, including alteration plans to existing LDE, to the LDEM for review and approval prior to contract award.

1.6.2 Facilities Operations Manager (FOM) shall:

Notify the building occupants of potential safety hazards in regards to the use of LDE in and around facilities under their cognizance. When notified by the LDE Owner or LSU of a lifting operation with unusual hazards or safety implications (i.e., potential to affect occupants beyond the immediate lift area), the FOM will review the proposed lifting operation(s) and concur prior to commencing lifting operations.

1.6.3 Safety Division (GB, Code 360, WFF, and Code 803) shall:

Notify the LDEM if lifting activities are not in compliance with OSHA and NASA-STD 8719.9.

Note: Those assigned to the Safety Division are considered Safety Representatives per this directive.

1.6.4 Medical/Environmental Management Division/Code 250 shall:

Provide medical expertise for the establishment of LDE operator medical examination criteria using applicable NPR 1800.1 requirements.

1.6.5 Office of Human Capital Management (OHCM):

Coordinates with the LDEM to document training offerings and registering participants in SATERN.

1.6.6 The responsible Contracting Officer and the Project Manager (PM)/Lifting Service User (LSU) shall apply requirements of this directive to contractor, tenant, or customer if non-NASA lifting operations place NASA personnel, facilities, or other property at risk through incorporation into their respective contracts.

1.6.7 Supervisors, project managers, or designees shall ensure that LDE personnel (i.e. lift-team members as referenced in this document in Section 1.5) are qualified to perform their role safely and effectively, based on training, prior experience, and physical abilities-including proper manual lifting techniques.

2 LDE Certification

All LDE will be used consistent with its intended purpose per OEM recommendations. The use of LDE that is contrary to OEM instructions or recommendations is not permitted, unless approved by the LDEM and complies with NASA-STD 8719.9, OSHA, and the applicable NCS.

The use of uncertified LDE for lifting operations is not permitted.

2.1 Items Subject to LDE Program Certification

LDE shall be traceable to a credible source, such as its OEM or a valid cognizant engineering source.

LDE equipment subject to formal certification include those listed in NASA-STD 8719.9. Additional items may be included at the discretion of the LDEM. Rented/Leased LDE used strictly for construction and maintenance activities are exempt from meeting GSFC LDE Certification requirements but must meet applicable NCS and OSHA requirements.

Load Measuring Devices will be verified by the LSU for structural integrity in the load path. Calibration of these devices will be the owner's responsibility.

2.2 LDE Certification Requirements

The certification requirements below are in addition to or are clarifications of the standards specified in the NASA-STD 8719.9 and applicable GSFC directives, NCS and OSHA standards.

2.2.1 LDE shall be certified and recertified by the LDEM in accordance with the NASA-STD 8719.9 and this directive; Re-certification will also be based upon verification and acceptance of design safety factors, load testing, inspections and nondestructive testing reports, as applicable.

2.2.2 Specialized Lifting Equipment (LE) Assemblies: the LDEM shall certify/re-certify LE assemblies in accordance with the NASA STD 8719.9, GSFC procedures and this directive.

a. Altered LE assemblies may not be re-certified as a system unless specifically exempted by a waiver which has been reviewed and approved in accordance with this directive. Alterations include the modification, addition, replacement, or deletion of components from the original certified configuration. Replacement of identical, individually certified and tagged components of equal or greater load ratings that do not adversely affect the original load path is permissible without having to recertify the LE assembly, with the LDEM approval.

b. All components comprising a critical LE assembly will be uniquely identified and controlled, and should not be interchanged for use in other applications.

2.2.3 Contractor Organizations: The LDEM may authorize the applicable contractor organization to perform LDE certifications (tests and inspections) at government owned, contractor operated facilities by the applicable contractor organization provided the contractor has a test and inspection plan satisfactorily addressing GSFC requirements, including personnel qualifications; and the contractor's plan has been reviewed and approved by the LDEM.

2.2.4 LDE Test and Inspection Reports: LDE test and inspection reports are forwarded to the LDEM for annual re-certification and record keeping.

2.2.5 Criticality Category (Critical or Non-Critical): The owning organizations shall specify the criticality category of lifting operations to be performed by the LDE so that the LDEM may provide the requisite compliance requirements for the LDE.

2.2.6 Load Testing: New or modified LDE shall be proof load tested in accordance with NASA-STD 8719.9; and for periodic recertification, be load tested in accordance with NASA-STD 8719.9.

a. Load test shall be done in accordance with OEM instructions and the applicable NCS and OSHA standards. Where no specific OEM guidance is provided, only 100% of the rated capacity will be used.

b. Approved test weights or calibrated load cells and test equipment shall be used for all LDE load-testing activities.

c. Fixed anchorages shall not be used without a valid engineering analysis approved by the LDEM.

2.2.7 Nondestructive Testing (NDT) Inspection: All NDT inspections required by NASA-STD 8719.9 shall be performed in accordance with the applicable NASA and NCS standards.

2.2.8 LDE (cranes and hoists) Usage Status and Inspection Requirements: Inspection requirements are based on the usage categories of LDs. Inspection requirements and intervals are defined by NASA-STD 8719.9, OSHA and GSFC LDE Program approved procedures.

a. Active LDE (cranes and hoists) **–** are available for unlimited daily use and required inspections shall be performed and recorded at the required intervals.

b. Standby /Idle (cranes and hoists) – when not in use will be secured to prevent unauthorized operation; LD operation shall be resumed only after required inspections are performed and recorded.

2.2.9 Re-Rating LDE:

a. Re-rating of LDEs to a higher capacity than the OEM rated capacity is not permitted.

b. Down-rating LDE capacity for reasons involving operational efficiency, adverse operating conditions and limitations of the supporting structures are permissible with LDEM approval.

c. Down-rating LDE may also be accomplished administratively (not requiring re-inspection or load test) if the LDEs certification is current and with LDEM approval. The new down rated capacity shall be displayed with proper tags and markings.

2.2.10 Transfer of LDE: Certification documentation (including OEM documentation) will accompany all LDE permanently transferred to GSFC to be reviewed and approved by the LDEM for LDE program compliance.

2.2.11 LDE Certification Tagging: Tagging will be performed in accordance with GSFC LDE program tagging procedures.

a. Once the required frequent or periodic inspections, load test, post-load test NDT inspections and engineering analysis (i.e. stress, stability analysis, etc.) and other documentation (i.e. assembly drawings, OEM documentation, etc.) have been reviewed and approved by the LDEM, certification tags will be issued for all LDE by the LDEM.

b. A single certification tag may be applied to a LE assembly where the individual items are marked, tethered (color coding at lifting equipment attachment points), or otherwise controlled as an assembly, and there are no plans to disassemble or rearrange the configuration of the assembly. Individual components must be marked with the assembly designation or an acceptable marking that

allows tracing of that component. Assemblies with a single configuration shall be tethered together with a method that prevents accidental disassembly.

c. Individual certification tags may also be applied to each component of a LE assembly that may potentially be disassembled; or where the individual items of the assembly are not color-coded, tethered, or otherwise controlled as an assembly. The assembly may be load tested as a unit or each component load tested individually.

d. One certification tag per configuration will be applied to a LE assembly where the configuration may be rearranged for different applications. The assembly shall be load tested in all applicable configurations;

Note: the number of tags used may vary depending upon the similarities among the different load tested configurations.

e. LE components may be individually tagged after load test and post-load test ASME B30 series inspection has been performed on each component.

f. LDE tags will indicate the next recertification and load test dates and unless otherwise indicated, typically expire on the last day of the month, one year from the month in which the tag was issued.

3 Personnel Qualification and Certification Requirements

3.1 Nondestructive Testing (NDT) Personnel

Personnel performing NDT shall meet the training requirements of NASA-STD 8719.9.

3.2 LDE Operators

3.2.1 LDE operators shall obtain formal training in the appropriate LDE operations as specified in NASA-STD 8719.9.

3.2.2 LDE operators shall be required to pass an applicable medical examination every 3 years in accordance with NPR 1800.1 or other medical exam approved by the GSFC medical director.

3.2.3 Practical/hands-on training in LDE operations and rigging shall be completed under the direction of a licensed LDE operator.

3.2.4 When using LDE requiring fall protection (i.e. boom lifts, etc), proof of successful completion of an approved fall protection training course in accordance with GPR 8715.8 will be required.

3.2.5 Upon satisfactory completion of the required classroom training and proficiency demonstration, the LDE operator will be certified for the type of LDE he/she has received training on. The LDE operator's license may specify the type of LDE the operator is qualified for.

3.2.6 LDE operator's with prior LDE training and experience may be evaluated for certification by the LDEM on a case by case basis. At the discretion of the LDEM, LDE Operators may be required to pass a GSFC LDE written examination.

3.2.7 LDE Licenses and Training Requirements:

a. Apprentice Crane Operator License: The apprentice will be certified as a non-critical crane operator/rigger upon satisfactory completion of the required training specified below:

(1) Non-critical crane operator introductory training class;
(2) Minimum of 40 hours of non-critical lift hands-on training which is to include 20 hours of non-critical lift rigging (verified by supervisor);
(3) Non-critical crane operator refresher training class; and
(4) Satisfactory demonstration of hands-on proficiency.

b. Non-Critical Crane Operator/Rigger License requirements: The non-critical crane operator will be certified in accordance with the NASA-STD 8719.9 to operate non-critical cranes only and as a non-critical rigger.

c. Critical Crane Operator/Rigger License requirements: The critical crane operator will be certified to operate both non-critical and critical cranes and perform critical rigging upon satisfactory completion of the required training and criteria specified below:

(1) Hold current license as a non-critical crane operator (exceptions to this requirement may be granted at the discretion of the LDEM);
(2) Minimum of 40 hours of critical lift hands-on training which is to include 20 hours of critical lift rigging (verified by supervisor); and
(3) Complete the critical lift crane operator training class.

d. Mobile Aerial Platform (MAP) and Powered Industrial Truck (PIT) Operator License requirements: MAP and PIT operators will be certified in accordance with the NASA-STD 8719.9. The license may indicate the specific type of equipment the operator is qualified to operate.

3.2.8 LDE Operator Recertification: LDE operators will be recertified every 4 years with the exception of PITs- every 3 years and critical cranes- every 2 years, in accordance with the NASA-STD 8719.9.

3.2.9 Reciprocity with Licensing Authorities: At the LDEM's discretion, a temporary LDE Operator's License may be issued to personnel on temporary assignment to GSFC provided that the candidate:

a. Possesses a valid LDE operator's license or equivalent issued by another licensing authority in compliance with requirements contained in NASA-STD 8719.9;

b. The candidate's license or equivalent remains valid for the duration of the candidate's assignment at GSFC; and
c. Temporary LDE Operator Licenses will be valid for the duration of the candidate's assignment at GSFC, and shall not exceed 90 days. Thereafter, a GSFC LDE operator's License will be required.

3.2.10 License Revocation: The LDEM may exercise the right to revoke LDE Operator's Licenses for any of the following reasons:

a. Failure to meet LDE Program-required training;
b. Failure to meet medical examination requirements per NPR 1800.1;
c. Violations or noncompliance with any of the safety requirements in documented procedures; or
d. Recommendations by an appointed panel of inquiry or Mishap Investigation Board.

Revoked operator licenses will be returned to the LDEM immediately, and may be reinstated upon satisfactory completion of applicable refresher training or other remedial action deemed appropriate by the LDEM.

3.2.11 License extensions may be granted, up to 90 days maximum, to allow for project demands and class scheduling flexibility. To be eligible for a license extension the operator must request the extension prior to the expiration date of the license and have a current medical examination. Extensions will not be granted if the license or medical examination has expired.

4 LDE Operations

4.1 Lifting Operations Requirements

4.1.1 A Pre-Lift Briefing will be performed for all lifting activities regardless of familiarization or experience of those performing the task or operation. The pre-lift briefing is aimed at ensuring the safety and coordination of the personnel and equipment involved.

a. The pre-lift briefing should be conducted prior to beginning lifting operations and involve all personnel having a role in the operation.

Note: *For routine operations under paragraph 1.5.1 e, the briefing may be performed verbally with the operator's immediate supervisor, or designee.*

b. If a new or different lift team member arrives after the lift has begun, such as when a shift change occurs, the incoming personnel should be sufficiently briefed to ensure they fully understand their roles, the tasks to be performed, and all relevant elements of the pre-lift briefing. This is accomplished by halting the operation at a safe point and conducting a new briefing with all personnel involved.

4.1.2 Institutional Lifts may involve the use of LDE or be a manual lift performed as part of the facilities operations, maintenance, or construction activities of GSFC. An institutional lift may

be classified as critical or non-critical depending on the hardware, lift complexity or hazards involved in the lift operation.

4.1.3 Personnel Lift and Suspended Load Operations involving the lifting of personnel with a crane, and lifts where personnel are required to work under a suspended load shall be defined as critical lifts and will be done in accordance with the requirements of NASA-STD 8719.9.

4.1.4 Manual Lifts may range in complexity from handling a lightweight item of equipment to supporting an item of space flight hardware while LDE is repositioned. Certain manual lifts may be determined to be critical by the LDE Owner or LSU.

a. If a manual lift is determined to be a critical lift, the following safe lifting and handling load limits will apply:

(1) 35 lbs. (15.8 kg) of manageable shape and size for one person
(2) 75 lbs. (34 kg) of manageable shape and size for two people
(3) 100 lbs. (45.4 kg) of manageable shape and size for three people

b. No critical manual lift will be performed for a load exceeding *100 lbs* unless written concurrence from a safety representative has been obtained.

4.1.5 Constrained Lifts present additional risk/hazards to personnel. If not controlled properly, lifting constrained loads can result in an inadvertent sudden increase in the loading on LDE and the hardware component being lifted due to sudden binding and/or friction between components during the lift. This can quickly result in exceeding the safe working load capacity of the LDE and also over stress and damage the hardware or equipment being lifted.

a. Constrained lifts shall only be conducted with the concurrence of the LDEM.

b. Constrained lifts should be treated as critical lifts for flight projects, thus requiring a written procedure.

c. Constrained lifts involving institutional lifts, the LDEM should be consulted for criticality determination.

4.2 Documentation Requirements

Lift procedures shall be developed for all crane lifts, with the exception of non-critical overhead crane operations.

4.2.1 Written non-critical lift procedures should be kept available in the work area and may be generic based on the type of lift or LDE specific. The procedures should include, but may not be limited to, LDE operating instructions, operator certification or training requirements, equipment certification requirements, rigging instructions, pre-lift briefing and other information needed to

ensure safe performance of lifting operations in order to eliminate or minimize risk to personnel and equipment/hardware.

4.2.2 Critical lift procedures shall be written procedures developed as required per NASA-STD 8719.9 for each critical lifting operation.

a. Critical lift procedures are the responsibility of the LSU, and as a minimum be reviewed and approved by the LSU, Safety Representative and PIC.

b. The critical lifting procedure will contain a list of all LDE (slings, hoist rings, shackles, turnbuckles, spreader bars, lifting assemblies, load positing devices Set, load-measuring devices, and any other hardware components) used in the lifting operation; and the following information will be included in the procedure for each item attached in the load path: SWL, actual load based on configuration, certification expiration date, and LDE Program device number.

c. Coordination for directing the lifting operation will be delineated in the Critical Lift Procedure and emphasized in the pre-lift briefing. Any transfer of a designated lift team member's (signal person) responsibility for directing the lifting operation will be identified in the Critical Lift Procedure and emphasized in the pre-lift briefing.

4.2.3 Institutional lift procedures will be developed by the LSU or PIC and be adequate for the complexity of the lift.

5 Waivers

If the requirements of this directive cannot be met, a waiver request shall be prepared in accordance with GPR 1400.1.

6. GSFC, Greenbelt Specific

6.1 Under the authority of Section 2.1, the following item(s) are considered under the Greenbelt LDE Program; Lifting Carts (critical use)

6.2 Mobile Aerial Platform (MAP) Operations – When a MAP is being driven in the backwards motion or when being used near flight hardware, a spotter shall be used to assure the MAP does not come in contact with items nearby. For other operations involving a MAP, a spotter should be used. A spotter may perform other tasks as long as it does not hamper with their ability to perform the responsibilities of the designated spotter (assist operator in movement and/or emergencies).

6.2.1 Prior to vertical movement (ascension) use of the MAP, the operator shall brief the spotter with the planned use of the MAP and instructions on how to lower the platform to its base, in case of an emergency.

6.2.2 At no time, shall the spotter be located in the platform and/or basket. Spotters should have formal MAP operator training.

6.3 Inspections of LDE shall be documented by Laboratory Quality Management System (LQMS, electronically), a GSFC LDE Form (see below), or a form approved, prior to use, by the LDEM.

a. GSFC23-11 GSFC Powered Industrial Truck (PIT) Daily Check
b. GSFC23-12 GSFC Overhead Crane Daily Check List
c. GSFC23-13 GSFC Mobile Aerial Platform (MAP) Daily Check List
d. GSFC23-36 Equipment Inspection - Mechanical Jacks
e. GSFC23-37 Equipment Inspection - Hydraulic Jacks
f. GSFC23-39 Rigging Equipment Inspection - Wire Rope Slings
g. GSFC23-40 Rigging Equipment Inspection - Metal Mesh Slings
h. GSFC23-41 Rigging Equipment Inspection - Synthetic Rope Slings
i. GSFC23-42 Rigging Equipment Inspection - Synthetic Webbing Slings
j. GSFC23-43 Rigging Equipment Inspection - Polyester Round Slings
k. GSFC23-44 Rigging Equipment Inspection - Hooks
l. GSFC23-45 Rigging Equipment Inspection - Structural and Mechanical Lifting Devices
m. GSFC23-46 Rigging Equipment Inspection -- Shackles, Adjustable Hardware, Links, Rings, Swivels
n. GSFC23-47 Rigging Equipment Inspection - Rigging Blocks
o. GSFC23-48 Rigging Equipment Inspection - Alloy Steel Chain Slings

6.4 If a person is required by another standard to have a medical examination, he or she shall use form GSFC 23-10, GSFC Contractor Occupational Health Evaluation for Lifting Devices and Equipment Operator, to document such examination, use of different form or documentation will need to be approved by the GSFC Medical Director.

6.6 When a rented or leased LDE is brought on Center, the Center point of contact will assure that an approval has been granted by the LDEM. To assist in the process of granting approval, the following permit application shall be filled out: GSFC 23-8 Lifting Device & Equipment (LDE) Permit Application. For all mobile cranes coming on Center, the following form will be submitted with Form GSFC 23-8: GSFC 23-14 GSFC Mobile Crane Lift Plan Worksheet.

6.7 Modification of rigging equipment shall be etched or permanently engraved with a traceable identifiable unique number. Engraving of the equipment by the manufacturer is an acceptable means to meet this requirement. An example of modification may be include nickel or chrome plating of items after production or replacing of bolt or pin from item.

6.8 When submitting a lift sling assembly for certification the LDE owner shall fill out GSFC 23-9 GSFC LDE/GSE Certification Checklist.

6.10 When LDE is used to proof-test ground support equipment or lifting equipment, the LDEM shall be notified prior to the lift to assure that proper lifting and safety procedures are followed by those performing the test.

Appendix A – Definitions

Most of the terms used in this directive are defined in NASA-STD-8719.9 or NASA-STD-8709.22. Those that are critical and/or unique to this document are listed below.

A.1 **Apprentice LDE Crane Operator License** – A LDE crane operator's license that allows a new operator to gain practical/hands-on training in non-critical crane and rigging operations under the direction of a licensed crane operator/rigger.

A.2 **Certification/Recertification** – A process performed, to the satisfaction of the LDEM, that leads to the initial or continuation of certification that a specific LDE is safe to use within specified OEM limitations and/or LDE program certification parameters; and may include but is not limited to LDE compliance and documentation reviews involving load tests, operational tests, inspections, nondestructive testing, OEM documents and engineering analyses.

A.3 **Constrained Lift** – Any lift where the load is not free to move (such that a larger than planned movement of the LDE can result in greater than planned stresses on the load and the LDE). An example would be a lifting/handling operation where a crane or hoist is required to relieve just enough of the weight of its load in order to remove and/or release the attachment fasteners. Common constrained lift situations include off-loading the weight of a piece of flight hardware attached to a handling/holding fixture, mating or de-mating flight hardware components, removing chiller end caps or any other type of lifting operation that a potential for binding exist. Constrained lifts are considered critical.

A.4 **Criticality** – A term that refers to the lift category classification: critical or non-critical.

A.5 **Installation Director** – Person in charge of respective site location, commonly referred to as the Center Director

A.6 **Institutional Lift** – A lift performed as part of the facilities operations, maintenance, or construction activities of GSFC, such as lifting a section of pipe or moving a pallet of office supplies and does not involve flight hardware.

A.7 **LDE Operator Certification** – The documented status of LDE operators (Crane Operator, MAP Operator, and PIT Operator) validating that they are trained and qualified in accordance with NASA-STD 8719.9 and certified by the LDEM.

A.8 **LDE Owner** – For the purposes of this directive the "LDE Owner" includes Division Offices, Program/Project Offices, etc. who are the assigned custodian of LDE property.

A.9 **LDE Program** – An established GSFC program that provides certification and recertification expertise, management, and oversight for LDE and LDE personnel.

A.10 **Lift Analysis** – An analysis performed to determine the maximum load the LDE is expected to experience during the worst case lift and may also include a stress and stability analysis.

A.11 **Lift Procedure/Plan** – A specific written step-by-step procedure/plan to be followed by the lift team to perform a lift operation. The procedure also defines the roles and responsibilities of all lift team members, and pertinent items to be verified prior to the lift.

A.12 **Lifting Cart -** Sometimes referred to as lifting tables, for the purpose of this document a lifting cart is a wheeled apparatus that typically has a handle and a platform that can be raised or lowered; most common mechanism is by hydraulic scissors or a mechanical post.

A.13 **Lift Categories (Criticality)** – Lifts are classified in two categories: critical or non-critical.

A.14 Lifting Devices (LD) – Machines such as overhead and gantry cranes (including top running, monorail, under hung, and jib cranes), mobile cranes and derricks, gantries, hoists and winches, special hoist-supported personnel lifting devices, Hydra Sets, mobile aerial platforms, powered industrial trucks, and jacks.

A.15 Lifting Devices and Equipment (LDE) – The collective term that includes both Lifting Devices (LD) and Lifting Equipment (LE).

A.16 Lifting Equipment (LE) – Below the hook lifting devices such as slings and sling assemblies, strong backs, spreader bars, shackles, load-measuring devices, and other hardware components used to attach the load(s) to the lifting device(s).

A.17 Lifting Service User (LSU) – The recipient of the lifting services being provided. Typically the owner of the hardware being lifted or handled, represented by the Program/ Project Manager (for institutional, facilities, or flight) or their designated representative.

A.18 Manual Lift – A lift where a person lifts and/or moves an item without the use of LDE (other than handles, etc. provide to facilitate manual lifting).

A.19 Pre-Lift Briefing – A briefing of involved personnel held prior to the commencement of a critical lift or other designated lift.

A.20 Pre-Use Daily Inspection/ Checklist – An inspection and operational check performed on LDE on a daily basis and recorded on a checklist prior to commencing operations.

A.21 Privatization Clauses – Contractual language dealing with government out sourcing of services or functions to private firms.

A.22 Safety Representative –Is considered a safety specialist per the requirements of 29 CFR 1960 and meets the training requirements as set forth within 29 CFR 1960.

A.23 Stability Analysis – An engineering evaluation process of calculating the location of the Center of Gravity (CG) of a load or mass in relation to the location of its reaction points (i.e. lifting points, support base). A satisfactory evaluation (i.e. CG located below and within the lift points, etc.) with adequate safety margins will ensure that a load or mass will remain stable when placed on a supporting base or when lifted or handled by LDE. The analysis includes consideration of lateral loads which may be impacted by movement of the LDE or the load.

A.24 Stress Analysis – An engineering discipline covering methods to determine the stresses and strains in materials and structures subjected to forces or loads in order to ensure its satisfactory strength or load carrying capacity. The analysis includes consideration of the static and dynamic distribution of the stresses among the lift points. A positive margin on safety factors of *three* on yield strength and *five* on ultimate strength must be demonstrated for all LDE designs.

A.25 Support Services Contractor – Services acquired by contract from non-governmental sources to support an organization's mission, management, policy, or program or project management and administration

A.26 Tenant – A non-NASA entity or organization that has obtained GSFC's permission to reside on the Center.

Appendix B – Acronyms

CG	Center of Gravity
FMD	Facilities Management Division
GB	Greenbelt
GPR	Goddard Procedural Requirements
GSFC	Goddard Space Flight Center
HQ	NASA Headquarters
HOP	Hazardous Operating Procedures
KG	Kilograms
LBS.	Pounds
LD	Lifting Device (cranes, hoist, etc.)
LDE	Lifting Devices and Equipment
LDEC	LDE Committee
LDEM	LDE Manager
LE	Lifting Equipment (below the hook rigging gear and hardware, etc)
LSU	Lifting Service User
LQMS	Laboratory Quality Management System
MAP	Mobile Aerial Platform (Man-lifts, Scissor Lifts, Boom Lifts)
NASA	National Aeronautics & Space Administration
NCS	National Consensus Standard
NDT	Nondestructive Testing
NPR	NASA Procedural Requirements
NRRS	NASA Records Retention Schedules
OEM	Original Equipment Manufacturer
OHCM	Office of Human Capital and Management
OSHA	Occupational Safety and Health Administration (29 CFR 1910, 29 CFR 1926)
PIC	Person-In-Charge
PM	Program/Project Manager
PPE	Personal Protective Equipment
PIT	Powered Industrial Truck (Fork-Lifts)
SATERN	System for Administration, Training and Educational Resources, for NASA
STD	Standard
SWL	Safe Working Load
WFF	Wallops Flight Facility

Appendix C – Barrier Recommendations

Safety barriers should be red, unless red "Danger" tape is used in conjunction with the barrier.

***Note**: Flashing red lights may also be added for increased barrier visibility.*

The following operations should have barriers:

1. Operation of Mobile Aerial Platforms and/or Powered Industrial Trucks:
    a. Area of travel or swing plus 5 feet to account for any dropped tools and/or bounce.

2. Crane lifts when the load will be lifted less than 5 feet from the working surface:
    a. Greater than 25% of sling length (use of a 10' sling would require 12.5' of barricaded distance) with a minimum distance of 10'.

3. Crane lifts when the load will be more than 5 feet from the working surface:
    a. 25' from the center of the load on all sides.

Change History Log

Revision	Effective Date	Description of Changes
Baseline	11/23/04	Initial Release
Baseline	10/27/05	Administratively changed to reflect responsible office change from Code 540, Mechanical Systems Division, to Code 250, Safety and Environmental Division.
A	05/08/09	Responsible office was changed from Code 250, Safety and Environmental Division, to Code 540, Mechanical Systems Division. Revised nomenclature to be consistent with latest HQ requirements in Paragraph 4. Added Paragraph 5, LDE Committee. General editorial changes for consistency with GPR 8834.1.
B	5/29/12	Added GID changes; Under Section 1, changed Occupational Safety to Code 350; under P.1 reflected that this directive is implementing the NASA Standard; under P.2a added additional references; reworded Section 1.2 to reflect current contract; ; Section 1.4 added to reflect owners responsible to control LDE; Section 1.4 added to reflect NASA Standard; Section 1.8 added to give LDE operator authority; Section 2.1.2.3 wording added for ANSI requirements; Section 2.4.2 changed to optional; Section 3.2.3 period of recertification changed to reflect NASA Standard. A note was added to Section 3.6 License Revocation. All definitions and acronyms were moved to the end of the document.
C	4/28/15	GPR 8719.1B and GPR 8834.1B were combined to eliminate redundancy between the two documents and the NASA LDE standard. Title changed to reflect this change. Responsible office was changed from Code 540, Mechanical Systems Division to Code 360 Safety Division.
D	3/19/18	Incorporating GID 8719.2 changes and updating document to reflect changes to NASA standard.